Wallenpaupack Area School District Planned Course Curriculum Guide

Department: Science

Name of Course: *Biology Honors
Biology CCR

Course Description:

*Biology Honors and Biology CCR – This course is taught with an emphasis on biological concepts. An inquiry-based, hands-on approach is used when appropriate. Topics include characteristics of life, compounds of life, cells, homoeostasis, cellular energy, cell division, DNA and genetics. The focal point of this course is to better prepare our high school students to investigate and understand these topics as they are related to the Pennsylvania STEELS.

Revision Date: April 2025

Jamie Mason-Clark, Jamie Bartholomew, M'liss Bonagura, Jen Peifer

Wallenpaupack Area School District Curriculum	
COURSE: *Honors Biology and Biology CCR	GRADE/S: 10th
UNIT 1: Review of Basic Science Topics	TIMEFRAME: 4-7 classes

PA STEELS:

3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

UNIT OBJECTIVES (SWBATS):

Students are expected to

- Explain the scientific method.
- Compare and contrast the scientific definition for theory and hypothesis.
- Exploring branches of biology.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Notes
- Worksheets
- Laboratory Activity
- Small and Large Group Discussions
- Group Work
- Independent Work
- Written Assignments – Based on Book/Chapter Questions

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- CDTs (Diagnostic)
- Formative Assessments
- Summative Assessments

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

Struggling Student – Remediation

Teacher /student individualized instruction to include...

- typed notes
- guided questions

- textbook review
- audio textbook

Advanced Student – Extension

Teacher /student individualized instruction to include...

*Student assignments are more in-depth, critical thinking incorporated increased independent work, and more challenging assessments.

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

Biology Foundation by Miller & Levine

*Biology by Miller & Levine

VOCABULARY: autotroph, bacteria, controlled experiment, data, heterotroph, hypothesis, inference, variable, observation, dependent and independent variables, scientific theory, scientific method, qualitative and quantitative data

Wallenpaupack Area School District Curriculum	
COURSE: *Honors Biology and Biology CCR	GRADE/S: 10th
UNIT 2: Macromolecules	TIMEFRAME: 4-7 classes

PA STEELS:

3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

3.1.9-12.F Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

3.1.9-12.G Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

UNIT OBJECTIVES (SWBATS):

Students are expected to

- Describe the characteristics common to all living organisms.
- Understand basic chemistry.
- Examine properties of water.
- Analyze the differences between the structure and function of macromolecules.
- Evaluate food for content of various macromolecules
- Interpret why enzymes are important to living things.
- Examine factors that affect enzyme function in living organisms.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Notes
- Worksheets
- Laboratory Activity
- Small and Large Group Discussions
- Group Work
- Independent Work
- Written Assignments – Based on Book/Chapter Questions

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RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

Biology Foundation by Miller & Levine

*Biology by Miller & Levine

VOCABULARY: activation energy, adhesion, amino acid, asexual reproduction, atom, base, biology, carbohydrate, catalyst, cell, cellulose, chemical bonds, chemical reaction, cohesion, compound, dehydration synthesis, deoxyribonucleic acid (DNA), electron, element, enzyme, glucose, homeostasis, hydrolysis, ion, lipid, molecule, monomer, monosaccharide, nucleic acid, nucleotide, nucleus, pH scale, polar molecule, polymer, polysaccharide, product, protein, reactant, ribonucleic acid (RNA), sexual reproduction, solute, solution, solvent, stimulus, substrate, and suspension

Wallenpaupack Area School District Curriculum	
COURSE: *Honors Biology and Biology CCR	GRADE/S: 10th
UNIT 3: Cells	TIMEFRAME: 7-10 classes

PA STEELS:
3.1.9-12.A Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

UNIT OBJECTIVES (SWBATS):

Students are expected to

- Explain cell theory.
- Categorize cells as prokaryotic and eukaryotic.
- Use a microscope to examine cells.
- Compare and contrast plant and animal cells.
- Categorize and describe the structure and function of organelles in eukaryotic cells.
- Distinguish between the four levels of organization in multicellular organisms.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Notes
- Worksheets
- Laboratory Activity
- Small and Large Group Discussions
- Group Work
- Independent Work
- Written Assignments – Based on Book/Chapter Questions

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RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

Biology Foundation by Miller & Levine

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RESOURCE SPECIFIC VOCABULARY: cell, cell membrane, cell theory, cell wall, centriole, chloroplast, chromosome, cytoplasm, endoplasmic reticulum, eukaryote, flagella, Golgi apparatus (body, apparatus), lysosome, mitochondrion, nucleus, nuclear envelope (membrane), nucleolus, organ, organ system, organelle, prokaryote, ribosome, tissue, vacuole, and vesicles.

Wallenpaupack Area School District Curriculum	
COURSE: *Honors Biology and Biology CCR	GRADE/S: 10th
UNIT 4: Cell Transport	TIMEFRAME: 8-11 classes

PA STEELS:

3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

UNIT OBJECTIVES (SWBATS):

Students are expected to

- Interpret the relationship between cell membrane structure and its function.
- Compare and contrast the processes of osmosis, diffusion, facilitated and active transport.
- Evaluate the effects of cells placed in hypertonic, hypotonic, and isotonic solutions.
- Analyze how cell transport maintains homeostasis in living organisms.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- PowerPoints and Notes
- Worksheets
- Laboratory Activity
- Small and Large Group Discussions
- Group Work
- Independent Work
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RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

Biology Foundation by Miller & Levine

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VOCABULARY: active transport, carrier (transport) proteins, cell membrane, cell wall, concentration, cytolysis, diffusion, endocytosis, equilibrium, exocytosis, facilitated diffusion, fluid-mosaic model, homeostasis, hydrophilic, hydrophobic, hypertonic, hypotonic, impermeable, isotonic, lipid bilayer, osmosis, passive transport, permeable, phagocytosis, pinocytosis, plasmolysis, selectively permeable, solute, solution, and solvent.

Wallenpaupack Area School District Curriculum	
COURSE: *Honors Biology and Biology CCR	GRADE/S: 10th
UNIT 5: Cellular Energy	TIMEFRAME: 7-10 classes

PA STEELS:
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
3.1.9-12.E Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
3.1.9-12.F Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
3.1.9-12.G Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
3.1.9-12.J Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

UNIT OBJECTIVES (SWBATS):

Students are expected to

- Explain the role of ATP in photosynthesis and cellular respiration.
- Interpret the role of light and chlorophyll in photosynthesis.
- Compare and contrast the processes of photosynthesis and respiration.
- Explain the chemical equations for photosynthesis and respiration.
- Distinguish between aerobic and anaerobic respiration.
- Analyze the relationship between the plant structures and their functions.
- Describe the cyclical nature of the energy transformations in photosynthesis and respiration.
- Describe the cyclical nature of matter in photosynthesis and respiration.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Notes
- Worksheets
- Laboratory Activity
- Small and Large Group Discussions
- Group Work
- Independent Work
- Written Assignments – Based on Book/Chapter Questions

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RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

Biology Foundation by Miller & Levine

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VOCABULARY: adenosine triphosphate (ATP), adenosine diphosphate (ADP) aerobic, anaerobic, autotroph, cellular respiration, chlorophyll, fermentation, glycolysis, guard cells, heterotroph, lactic acid, light-dependent reactions, light-independent, photosynthesis, photosystem, pigment, stomata, stroma, and thylakoid.

Wallenpaupack Area School District Curriculum	
COURSE: *Honors Biology and Biology CCR	GRADE/S: 10th
UNIT 6: Cell Cycle	TIMEFRAME: 8-11 classes

PA STEELS:

3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

3.1.9-12.D Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

UNIT OBJECTIVES (SWBATS):

Students are expected to

- Explore the stages of the cell cycle
- Describe the chromosomal structure
- Analyze and classify the stages of mitosis.
- Compare and contrast the stages of mitosis in plant and animal cells.
- Explain the factors that regulate the cell cycle.
- Interpret the ways cancer cells are different from normal cells

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- PowerPoints and Notes
- Worksheets
- Laboratory Activity
- Small and Large Group Discussions
- Group Work
- Independent Work
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RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

Biology Foundation by Miller & Levine

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VOCABULARY: anaphase, asexual reproduction, cancer, cell cycle, cell division, centriole, centromere, chromatid, chromatin, chromosomes, cytokinesis, daughter cell, homologous, interphase, metaphase, mitosis, prophase, sexual reproduction, spindle, telophase

Wallenpaupack Area School District Curriculum	
COURSE: *Honors Biology and Biology CCR	GRADE/S: 10th
UNIT 7: DNA and Protein Synthesis	TIMEFRAME: 9-12 classes

PA STEELS:
3.1.9-12.A Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
3.1.9-12.F Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
3.1.9-12.P Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

UNIT OBJECTIVES (SWBATS):

Students are expected to

- Arrange genes, DNA, and chromosomes based on their structure and function.
- Create and label models of DNA.
- Conduct a simulation of DNA replication.
- Synthesize a protein molecule given a DNA sequence.
- Predict the result of various DNA mutations on protein synthesis.
- Compare and contrast DNA and RNA.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Notes
- Worksheets
- Laboratory Activity
- Small and Large Group Discussions
- Group Work
- Independent Work
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VOCABULARY: adenine, anticodon, base pairing, codon, cytosine, deletions, deoxyribose, DNA, frame-shift mutation, gene, genome, guanine, insertion, messenger RNA, missense mutation, mutation, nitrogenous bases, nonsense mutation, nucleic acid, nucleotide, phosphate group, plasmid, point mutation, replication, ribose, ribosomal RNA, ribosome, protein synthesis, silent mutation, substitution, thymine, transcription, transfer RNA, translation, and uracil

Wallenpaupack Area School District Curriculum	
COURSE: *Honors Biology and Biology CCR	GRADE/S: 10th
UNIT 8: Meiosis and Genetics	TIMEFRAME: 13-16 classes

PA STEELS:
3.1.9-12.D Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
3.1.9-12.P Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
3.1.9-12.Q Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors
3.1.9-12.R Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
3.1.9-12.T Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

UNIT OBJECTIVES (SWBATS):

Students are expected to

- Compare and contrast the differences between meiosis and mitosis.
- Predict the outcome of nondisjunction during meiosis.
- Predict the outcomes of various crosses involving different types of inheritance (dominant, recessive, codominant, incomplete dominant, x-linked)
- Create and analyze pedigrees to determine patterns of inheritance.
- Conduct a blood typing experiment and analyze the results.
- Recognize the significance of probability on genetic inheritance.
- Distinguish between Mendelian and non-Mendelian genetics.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Notes
- Worksheets
- Laboratory Activity
- Small and Large Group Discussions
- Group Work
- Independent Work
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RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

Biology Foundation by Miller & Levine

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VOCABULARY: allele, autosome, codominance, crossing-over, diploid, fertilization, gamete, gene, gene recombination, genetics, genotype, haploid, heredity, heterozygous, homologous, homozygous, hybrid, incomplete dominance, independent assortment, inheritance, karyotype, meiosis, multiple alleles, nondisjunction, pedigree, phenotype, polygenic traits, probability, Punnett square, segregation, sex chromosome, sex-linked gene, tetrad, trait, true-breeding

Wallenpaupack Area School District Curriculum	
COURSE: *Honors Biology	GRADE/S: 10th
UNIT 9: Anatomy	TIMEFRAME: 4-7 classes

PA STEELS:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

UNIT OBJECTIVES (SWBATS):

Students are expected to

- Compare and contrast frog and human anatomy and physiology.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Notes
- Worksheets
- Laboratory Activity
- Small and Large Group Discussions
- Group Work
- Independent Work
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RESOURCE SPECIFIC VOCABULARY: body systems